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PLANT EXPLORERS IN SOUTH KOREA—Page 3

AGRICULTURAL
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Plants for Beautification

National beautification calls for flowers, shrubs, and trees from all parts of the world.

And the demand is increasing for different sizes and kinds of plants than those traditionally grown in this country. Many foundation plantings, for example, originally developed for the two- and three-story houses of a generation ago, are too large to effectively set off today's one-story rambler-style houses. Homeowners want small, slow-growing plants that will add attractiveness without obscuring light and view. More suitable shrubs and trees are also needed for planting along Federal-State highways under construction, as well as for landscaping industrial sites.

Plant exploration trips provide much of the breeding stock for new types or ornamentals adapted to the United States.

David Fairchild, the pioneer USDA plant explorer, traveled to Japan shortly after the turn of the century and returned with the first of the famous cherry trees of Washington, D.C. He also introduced zoysia lawn grass and some bamboo species.

Another early plant explorer, Frank Nicholas Meyer, sailed to China in 1905. Before his death there 13 years later, he gave the United States the Chinese elm, some ornamental willows, and wild roses. He also collected seeds for developing the Bradford pear, a "tree for all seasons" with colorful spring blossoms and brilliant fall foliage. It is moderate in size and well adapted to city lots.

After Meyer came a series of explorers who brought back new hollies, a hardy privet, and a galaxy of showy tropical and subtropical woody plants. Many of our azaleas were introduced by a pathologist who traveled to Japan in 1929.

In 1956, Longwood Gardens, Inc., Kennett Square, Pa., began sponsoring USDA exploration trips to find new ornamental plants. Since then, 10 exploration trips have been completed in Asia, Europe, South America, and Australia. It is still too soon, however, for these plants to have a place in American gardens.

The latest plant exploration trip—to South Korea—promises more interesting and exotic ornamental plants for future use in American landscapes. (p. 3).

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Orville L. Freeman, Secretary
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FOR EXOTIC ORNAMENTALS

Scientists Search South Korea

A "MAGIC" LILY and a yellow-flowered Weigela, a red-fruited spice bush and a pine with edible seeds—these and other exotic plants were brought back to the United States from a recent plant exploration trip to South Korea.

From this expedition—the 10th sponsored jointly by ARS and the Longwood Foundation and the first to Korea since 1929—may come interesting new ornamentals for beautifying American homes and cities.

During their 4-month tour, ARS horticulturist E. G. Corbett of the U.S.

E. G. Corbett (left) and R. W. Lighty look for persimmons at a Korean roadside market on one of their periodic checks for improved types of fruits, nuts, and vegetables for adaption in the United States.

N-59184

Right: Prof. Tchang Bok Lee (standing), Corbett (kneeling), and Lighty take cuttings from one of the many types of willows found in Korea.

N–59186

N–59189

Above: These blue-flowered asters grow on Mount Halla. The plants are low, reaching about 10 inches high.

Below: This lily, Lilium miquelianum, *grows wild throughout much of Korea.*

N–59183

Plant Introduction Station, Glenn Dale, Md., and geneticist R. W. Lighty of Longwood Gardens, Kennett Square, Pa., made more than 500 plant collections. The plants will be widely tested in the United States for adaptation and ornamental potential and for use as breeding stock.

Prof. Tchang Bok Lee of Seoul National University College of Agriculture, Suwom, assisted and guided the explorers.

The Korean climate is similar to that of the eastern United States—cold winters and hot summers—and many of the Korean plants are closely related to plants grown here. The explorers found two Korean islands especially fruitful: Ullung (Dagelet), a small island in the Sea of Japan, and Cheju (Quelpart), a large island south of the mainland.

Ullung is a fairly isolated island that has been populated only in modern times. Thus, most of its plants are still in their pure, wild form.

Cheju Island is dominated by Mount Halla, which is well over a mile high. Plants on this island range from those of a warm temperate habitat, similar to that in the southeastern United States, to alpine types near the mountain peak.

The scientists made four collections of the rare lily, *Lilium hansonii*, which occurs naturally only on Ullung Island. It was introduced into the United States once before, but could not be self-pollinated. If these new collections can be self-pollinated, they may provide valuable breeding material.

Another rare collection, the lily, *Lycoris korena*, is also new to this country. *Lycoris* is a bulb-type plant that is closely related to amaryllis. This "magic" lily puts forth a blossom on a single shoot—after the foliage has died.

The plant explorers also collected two flowering plants with different colored flowers than the same type of plants produce in the United States. One is a yellow-flowered Weigela. This popular, hardy shrub normally produces pink, red, or white flowers. The other is a white-flowered form of early blooming *Rhododendron mucronulatum*, an azalea whose flowers are usually purple-shaded.

Corbett said the explorers were particularly interested in finding low-growing trees or shrubs that would blend well with today's ranch-type home. Most of the arbovitae (a type of evergreen) now grown in this country are too tall. The most promising collection in this line is a Korean arborvitae, a low-growing evergreen tree. Another promising collection, a red-fruited spice bush, *Lindera erythrocarpa*, has unusually attractive foliage.

The explorers also brought back a potential ornamental that produces food—a Korean pine with tasty nut-like seeds. It is a five-needle pine, similar to our Eastern white pine.■

For Olive Processors

Recovery Method Reduces Stream Pollution

OLIVE PROCESSING plants may be able to solve a waste disposal problem and cut costs at the same time by using an ARS-developed process for cleaning and reusing brine.

Olives, like other fruits and vegetables, release sugars and a variety of compounds into processing solutions. These solutions also contain processing chemicals such as salt and lye. Contaminated solutions are commonly discarded into municipal sewage systems or streams, or lagooned on fields where solutions may seep into underground waters. Nine of California's large olive processing plants discharge upward of 200 million gallons of briny waste in a single season.

The problem has become so serious that olive processing plants face curtailed production to meet discharge requirements.

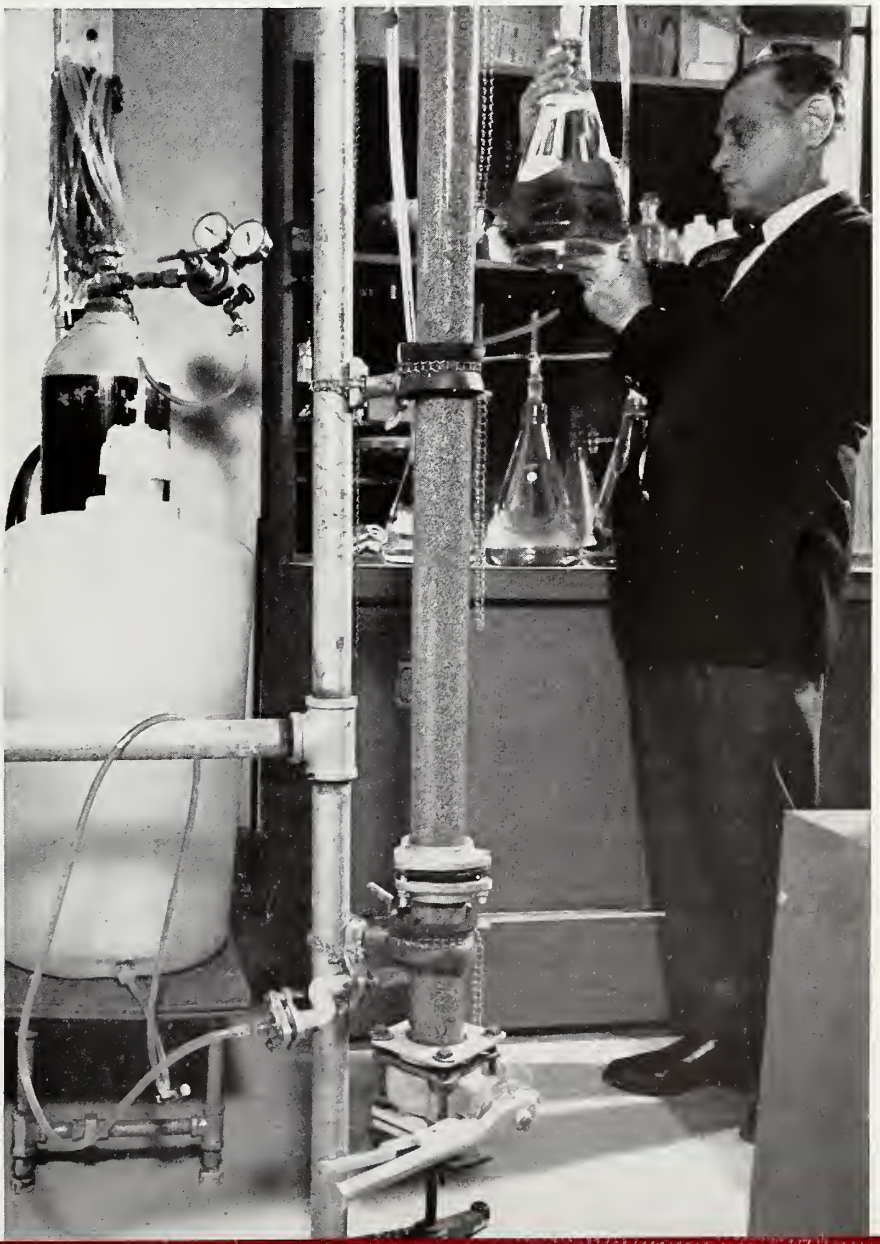
The experimental process developed by ARS chemists removes contaminants by passing used process liquids through a column of activated carbon. The solution enters contaminated and comes out as reusable brine. Contaminants are held in the carbon.

The same process may prove useful in removing wastes from other food processing solutions, such as those from brined cherries, pickles, and kraut.

Chemists Karel Popper, W. M. Camirand, G. G. Watters, and F. P. Boyle developed the method at the Western utilization research laboratory, Albany, Calif., in cooperation with R. J. Bouthilet, an industrial researcher. The research is part of efforts by ARS to improve our environment and solve problems of food processors.

A panel of experienced judges tasted the olives processed with recovered brine and found them as good as olives processed with fresh brine.

The method is also a money-saver The salt recovered is worth much more than the carbon used. In large operations, it should be possible to cut costs even further by reconditioning the carbon by a heat process. In any case, it is much easier to dispose of spent carbon than brine.■



PN–1486

Dr. Karel Popper examines the clean salt solution. In the experimental method, the waste solution in the white container (left) is forced through the glass column filled with carbon (center) and the clean solution is collected in the flasks behind Dr. Popper.

Technician M. E. Jackson prepares cornmeal fritters for a proposed recipe. Even though she uses simple equipment, thermometer maintains accurate check on frying heat.

ST–1359–5

ST–1359–21

Miss Jackson chops salad ingredients while food specialist Beverly Butler beats an egg for cornmeal fritters recipe. Both researchers use simple equipment—Miss Jackson, a knife instead of a grinder; Miss Butler, a spoon instead of an electric mixer or egg beater.

For Homemakers With Limited Budgets...

TASTY, NUTRITIOUS RECIPES

SIMPLE AND EASY-TO-FOLLOW RECIPES—using economical but nutritious foods—have been developed through ARS consumer use research, in cooperation with USDA's Consumer and Marketing Service.

They will be used in the *Thrifty Family Series*—leaflets meant primarily for use in nutrition education programs for low-income families taking part in the Commodity Distribution Program or the Food Stamp Program, which are administered nationally by C&MS.

The recipes are mainly simplified versions of well-known dishes. S. H. McManus and other ARS food specialists at Beltsville, Md., limited the recipes to five or six steps for preparation and no more than six or seven ingredients whenever possible.

The recipes are simply written and illustrated. A minimum of utensils, appliances, and cooking skills is called for. "We stress simplicity," Mrs. McManus says, "but not at the expense of nutritive value or flavor."

A taste test panel rates food prepared according to the recipes on appearance, aroma, texture, moisture, flavor, and overall appeal. Only foods that rate high on all six counts are accepted.

Each *Thrifty Family* leaflet is organized around a single type of food. Leaflets will be made available, as a part of nutrition education programs, to individual families receiving donated foods or food stamps. Single copies will also be made available to professional health and nutrition specialists working with other groups.

More *Thrifty Family* recipes developed through ARS research will be available during the coming year.■

For Peaches, Nectarines

Oxygen-Carbon Dioxide Storage

CONTROLLED ATMOSPHERES nearly doubled the normal storage life of fresh peaches and nectarines in tests at Beltsville, Md.

After 9 weeks in storage atmospheres of 1 percent oxygen and 5 percent carbon dioxide, peaches and nectarines were juicier, had better flesh color and flavor, and softened more like freshly harvested fruit than similar fruit from air storage.

In the Beltsville study, research horticulturists R. E. Anderson and C. S. Parsons and plant pathologist W. L. Smith studied Redhaven, Sunhigh, and Loring peaches and Late LeGrand nectarines for three seasons.

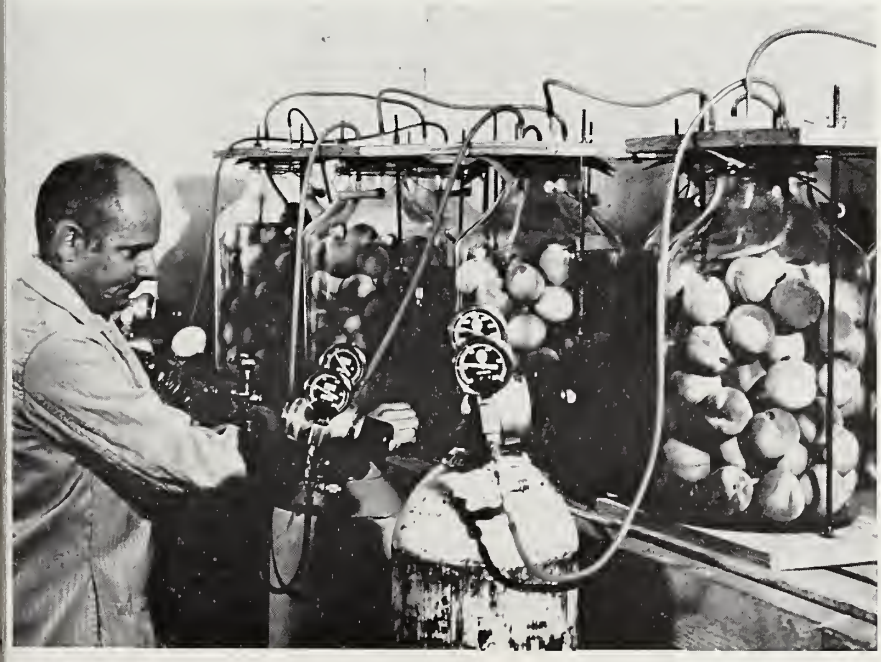
Additional studies of year-to-year fruit variations and tests of other fruit varieties are necessary, however, before recommendations can be made. The best harvesting times must also be determined.

Anderson tested six different atmospheres at 32° F. Oxygen levels of 0.25 and 1 percent as well as 21 percent, the oxygen level in air, were used, with and without the addition of 5 percent carbon dioxide. Fruit quality was evaluated after 3, 6, and 9 weeks and again after holding in air at 60° to 65° F. for ripening.

The external appearance remained good with all storage atmospheres, and internal flesh appeared normal when fruit was removed from storage. When fruit was ripened in air, however, small differences showed up after 3 weeks and became pronounced after 6 and 9 weeks.

Dr. R. E. Anderson checks the gas flow rate in storage atmosphere tests with Loring peaches at the Beltsville laboratory.

PN–1487



Ripened fruit from all oxygen and carbon dioxide atmospheres tested was juicy with good, yellow flesh color and little or no flesh breakdown. Some fruit from the 0.25-percent oxygen atmosphere developed off-flavors, however.

Fruit from the 1- and 21-percent oxygen atmospheres without carbon dioxide did not ripen satisfactorily and was unmarketable after 6 weeks. It became dry and grainy in texture and watery around the pit. Much of the fruit also had badly discolored flesh.

Fruit from carbon dioxide atmospheres was firmer at removal from storage than fruit without carbon dioxide. The fruit also softened at about the same rate as freshly harvested fruit while fruit from storage without carbon dioxide did not soften as readily.

In addition, the respiration rate of fruit in the carbon dioxide atmospheres was slower, indicating a slower deterioration rate and, therefore, a longer storage life.

Flavor also received considerable attention. Over 400 individual taste evaluations were made on fruit ripened in air after each treatment.

The taste panel selected fruit from the 1-percent oxygen and 5-percent carbon dioxide atmospheres over all the others. The decline in flavor was greatest in fruit from atmospheres without carbon dioxide.

Acidity decreased with more time in storage but decreased less in carbon dioxide atmospheres. This acidity may be related to taste—some taste panelists noted a bland flavor in fruit from atmospheres without carbon dioxide.■

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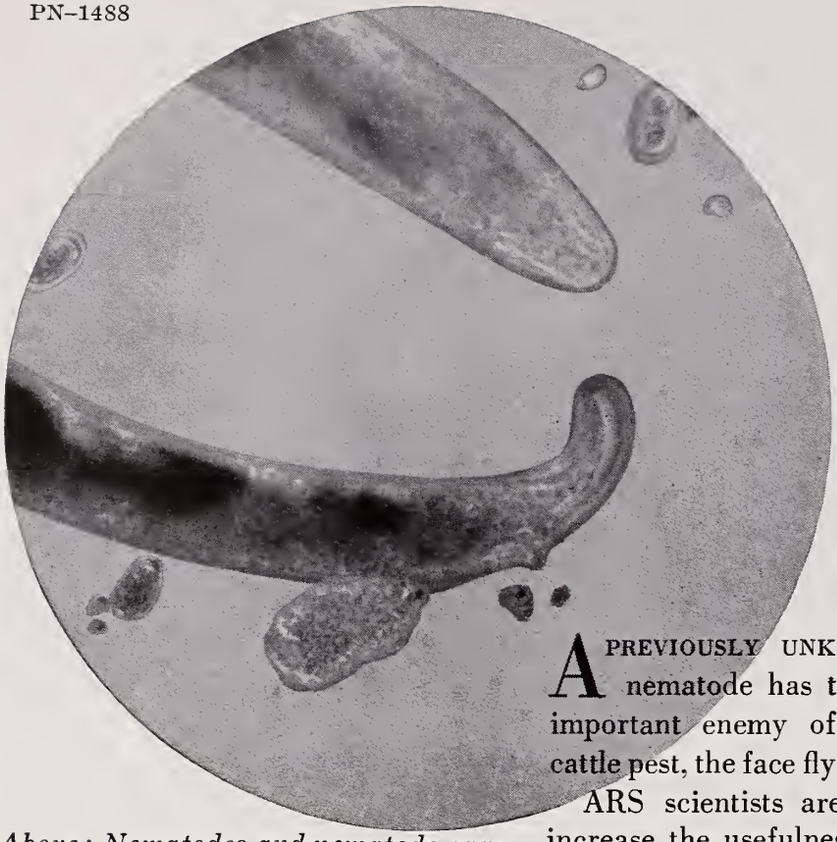
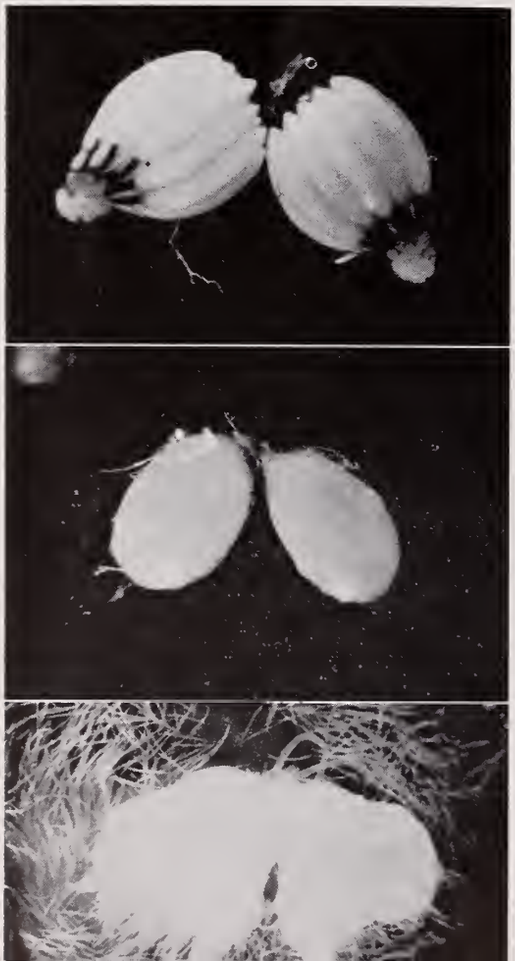


ATTACKING THE

A PARASITIC NEMATODE

Above: Nematodes and nematode eggs moments after removal from a fly's body cavity. Below: Normal uninfected ovaries of the face fly show symmetrical pod-shaped sections. Infected ovaries lose their form and cannot produce eggs. When infected ovaries are punctured, thousands of nematodes pour out.

PN–1489



A PREVIOUSLY UNKNOWN parasitic nematode has turned up as an important enemy of a major U.S. cattle pest, the face fly.

ARS scientists are now trying to increase the usefulness of this newly found ally.

Examination of face flies from New Jersey, Missouri, Nebraska, and New York showed one-fourth to one-third to be nematode-infected, according to nematologist W. R. Nickle of the ARS Nematode Taxonomy Laboratory, Beltsville, Md.

Earlier insect studies at Cornell University in New York had first alerted Nickle to the nematode, which he classed in the genus *Heterotylenchus*.

The face fly came to the United States from Europe in 1953. Since no European samples of face flies were infected with the nematode, Nickle concluded that a parasite native to North America adapted itself to the immigrant face fly. No other North American enemies of this pest have been found.

In field studies of the nematode at the ARS insectary, Lincoln, Nebr., entomologist C. M. Jones found that it does not attack other manure-breeding flies. Other flies, however, are infected by nematodes of a different species.

Jones believes a nematode of this kind could be mass-reared in the laboratory and spread with an air gun in pastures harboring face fly larvae. This procedure would be particularly useful in curbing the westward spread of face flies.

The face fly is suited to the life cycle of the nematode. At one stage, the nematodes live in cow manure where face flies habitually deposit their eggs. As face fly eggs hatch, the nematode females penetrate the larvae. Nematode males do not join the attack; they die inside the manure after mating.

Nematodes in the body cavity of the fly grow to about one-fifth inch long and then lay one to two dozen eggs, which hatch into nematode females. These in turn lay eggs that develop into thousands of tiny male and female nematodes. The second generation also develops inside the fly.

When fully developed, the nematodes migrate to the ovaries of the female face fly and destroy the insect's ability to produce eggs. The female face fly behaves as if the clusters of nematodes inside her ovaries were face fly eggs, and she deposits the nematode clusters in cow manure just as she would her own eggs.

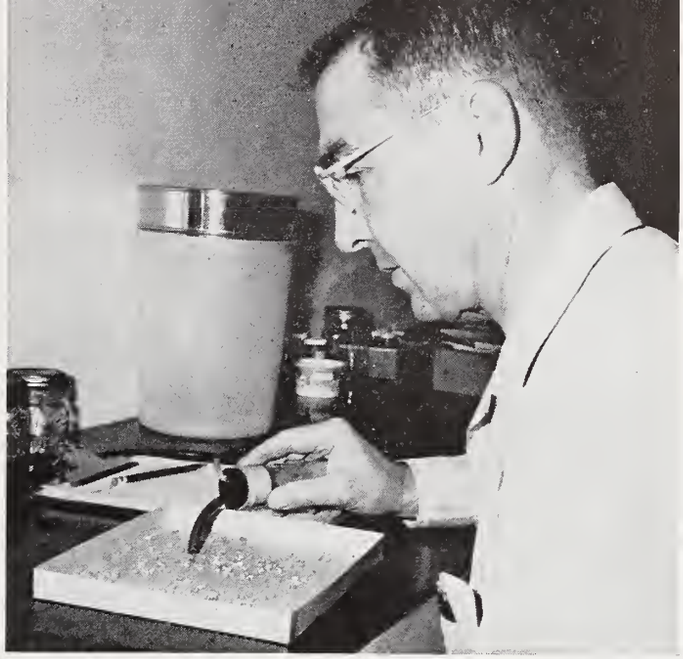
Once inside the manure, the nematodes mate, producing more females to invade newly hatched face fly larvae.■

FACE FLY

PN–1490

Upper right: Entomologist C. M. Jones gently separates parasitized face fly puparia from uninvaded puparia by using a hose connected to a vacuum pump.

Above: Upon reaching adulthood inside the face fly puparium, the beetle breaks open its old home and emerges.



PN–1491

AN IMPORTED PARASITIC BEETLE

ARS RESEARCHERS in Europe have found a parasitic beetle that is a natural enemy of the face fly.

The face fly, which came to the United States in 1953, is hard to control with insecticides because it breeds widely and can fly fairly great distances. Accordingly, ARS entomologists began searching for natural enemies of the fly in Europe, its original home.

In France, entomologists J. U. McGuire and J. J. Drea found that larvae of a staphylinid beetle, *Aleochara tristis*, completely devour face fly pupae and, upon emerging as adults, feed on face fly eggs and larvae.

After preliminary studies in France, McGuire and Drea sent a shipment of these beetles to entomologist C. M. Jones at the ARS insectary, Lincoln, Nebr., for study under U.S. conditions.

In 1965, Jones released 40,000 laboratory-reared beetles in a cattle pasture. When he later collected 870 face fly pupae, exactly 10 percent had been parasitized by the beetle larvae.

Laboratory-reared beetles, set out in late summer 1965, survived a severe Nebraska winter—temperatures as low as −15° F.—into the spring of 1966.

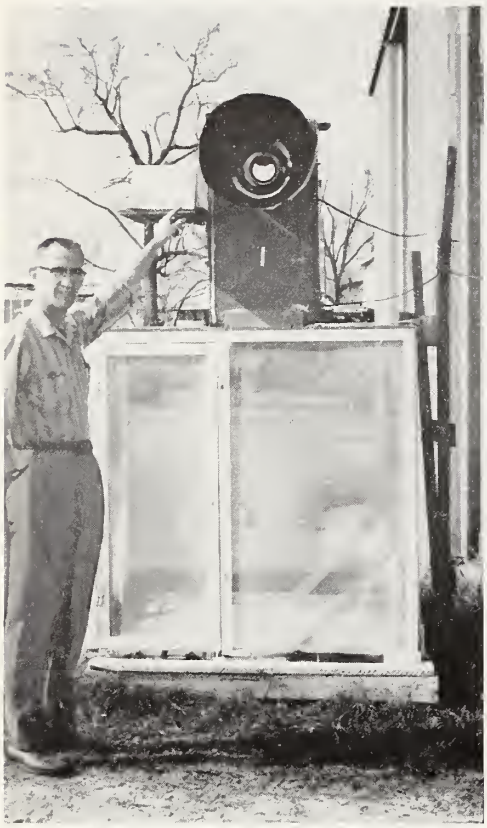
Although more tests are necessary before the usefulness of the beetle in face fly control can be fully evaluated, the face fly life cycle seems made to order for the predatory beetle. Both face fly and beetle females lay eggs only in fresh manure.

The beetle eggs hatch 4 to 5 days after being laid; face fly eggs hatch in 1 day. The face fly larvae develop into pupae in another 3 to 4 days, so that when the beetle larvae hatch, they find face fly pupae waiting for them.

The beetle larvae then drill holes in the fly puparia, sometimes taking turns to make a hole large enough to enter.

When the supply of fly puparia is limited, as many as nine beetle larvae will invade a single fly puparium, although a single pupa provides sufficient food for only one beetle larva.

Beetles prefer face fly pupae over those of closely related species. If face fly pupae are available, the beetles will ignore housefly and stable fly pupae.■



PN-1492

Agricultural Engineer J. C. Webb points to the high-intensity speaker mounted in a blacklight trap.

For Insect Studies . . .

HIGH-INTENSITY SOUND

SOUND, FOR MILLIONS of years a vital aid to insect survival, may doom two species of destructive pests.

ARS researchers have developed a high-intensity speaker for studying the effects of sound on the behavior of bollworm and tobacco budworm moths. High-intensity sound may cause seizures and death in the insects by damaging vital organs.

The study, part of research to develop nonchemical methods to control bollworms (also called tomato fruitworms and corn earworms) and tobacco budworms, is being conducted cooperatively with the South Carolina Experiment Station, Florence.

The speaker was developed by entomologist H. R. Agee and agricultural engineer J. C. Webb for incorporation into blacklight traps. It is of simple design, and total cost of parts and labor to construct the unit was $41.50.

Frequency range of the experimental speaker can vary from 10 to 100,000 cycles per second, in contrast to the average high-fidelity speaker with a frequency range from 35 to 15,000 cycles per second. The normal

Biological Clock Tells . . .

WHEN TO SPRAY INSECTS

THE BIOLOGICAL CLOCK that regulates an insect's daily activities can tell scientists, farmers, and homemakers when to spray for the best kill.

More houseflies and cockroaches died after spraying at 4 p.m. than at any other time, ARS entomologist W. N. Sullivan, Jr., discovered in tests at Beltsville, Md.

The insects' vulnerability fluctuates because their daily activity varies in a 24-hour cycle, called circadian rhythm, that is controlled by some unknown mechanism. The fly appears to be most active and the roach to be starting its most active period in late afternoon, their most vulnerable period.

Killing the pests at this time produces a greater kill with less insecticide.

The fly and roach tests were made indoors only. To make sure his findings indicated the influence of circadian rhythm, Sullivan confined the insects to large chambers where he could control such variables as light, darkness, and temperature that "set the clock" for the insects. The insecticide used was a pyrethrum aerosol.

Tests ran 24 hours a day for up to 3 days, in a series of experiments over a 2-year period. More than 4,000 roaches and 20,000 flies were tested.

Scientists must now determine how much less pesticide is needed when insects are sprayed at the time of peak vulnerability and whether results will be the same on insects sprayed outdoors.

Further studies may also reveal information about the life habits of other insects that could indicate the best time to spray them. Some scientists have reported that circadian rhythms govern the lives of crickets, boll weevils, and mites, in addition to the insects Sullivan studied.

Sullivan's results may at least partly explain why inconsistent results are obtained when new insecticides are tested by the same procedures except for various times of application. Until now, time was not considered a major variable under laboratory conditions.■

range of the human ear is from 15 to 20,000 cycles per second.

Sound level output is 80 to 100 decibels (units for measuring relative loudness of sound). Ordinary speech is about 60 decibels.

The speaker body is of half-hard aluminum bearing stock with one backplate of sintered brass and another of ⅛-inch sheet clear plastic. The diaphragm is made of polyester film, and a plastic cup holds the diaphragm against the speaker body. A ½-inch aluminum adjustment bolt adjusts the sound level output.■

PN-1493

Bryant Cawley, an entomology student at the University of Maryland and a part-time ARS employee, sprays insecticide into a test chamber containing flies and roaches.

Reducing Losses in . . .

PEANUT HARVESTING

PEANUT FARMERS MAY leave as much as 40 percent of their crop underground when they harvest.

An ARS study on peanut harvesting efficiency shows that one runner peanut pod left per 50 square inches (about the area covered by a size 10 shoe) equals some 380 pounds of peanuts lost per acre. Two pods in the same area indicate a loss of about 40 percent of a crop yielding 2,000 pounds per acre.

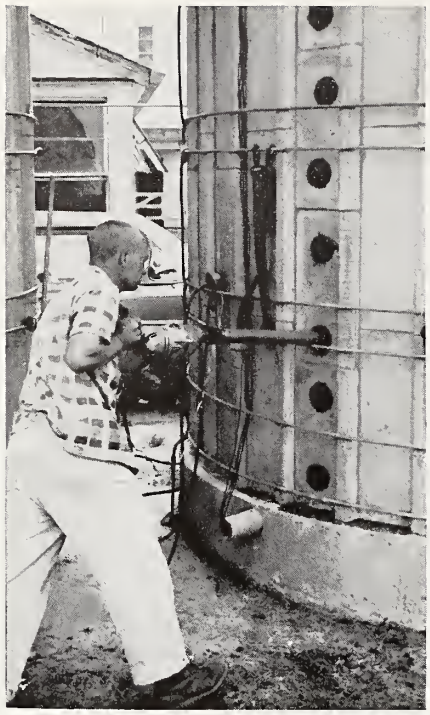
Most of the peanuts lost by the digger are underground, so the farmer is not aware of the magnitude of the loss. The Georgia Coastal Plains Experiment Station, Tifton, cooperated in the study.

What can a farmer do to reduce the amount of peanuts lost in the soil? Agricultural engineer J. L. Butler and engineering agent L. E. Samples of the Georgia station, say that recommended rotations, land preparation methods, cultural practices, and disease- and insect-control measures must first be followed to produce a weed-free field of healthy peanuts that are well developed at maturity.

The researchers also suggest that peanuts be dug as soon as they reach maturity. The most reliable method to determine when to dig Runner and Spanish types is to crack open randomly selected peanuts and inspect the inside of the hull. When 80 percent of the hulls are dark inside, it is time to dig Because Virginia-type peanuts do not show a marked darkening of the hull, stem strength and pod condition are the best indicators.

Once the farmer decides to dig, researchers say losses can be held to a minimum by following these nine points:

- If the tops are to be clipped, keep rotary mower blades sharp and the mower set high to avoid stripping the vines from the peanuts. Removing too much growth impairs shaking efficiency.
- Use colters in excessive vine growth to permit clean separation of the rows being dug. If this is not done, vines may be dragged from peanuts in adjacent rows.
- Use a digger-shaker of proven design and in good mechanical condition. Inadequate equipment will allow frames and blades to flex under the load, resulting in variable digging depth and economically serious pod losses.
- Digger blades and frogs (units that hold the plow bottom parts together) must be properly matched so that the rods are parallel to the rows. If the rods are at an angle, pods will be stripped off.
- Keep digger blades sharp. Dull blades will push the vines through the soil and strip the peanuts from the vines.
- Keep depth-gage wheels adjusted to insure and maintain proper digging depth.
- Adjust digger blades to the proper angle. Too much of an angle will result in soil being pushed ahead of the blades.
- Synchronize ground and rattler bar speeds. Otherwise, the vines will be torn from the peanuts.
- Set the windrow attachment to produce a fluffy windrow free of twisted vines and clumps. Good, uniform windrows promote combining efficiency.■



Research aide J. M. Cook drills out a silage sample for an analysis of endosulfan residues.

PN–1494

PROMISING PESTICIDE FOR FORAGE

ENDOSULFAN, ONE OF many pesticides tested during 8 years of research in Georgia, has shown up well in residue studies on pastures and silage.

USDA officials point out, however, that endosulfan can neither be recommended nor used for this purpose until the manufacturer registers the pesticide with USDA. This will require the establishment of a tolerance by the Food and Drug Administration.

ARS and Georgia scientists at the Georgia Coastal Plain Experiment Station, Tifton, found that endosulfan controls some destructive insects of forage crops, broadening the arsenal of insecticides available. However, it is currently registered with USDA for use only on some fruit and vegetable crops.

Endosulfan is a hybrid between chemicals like DDT that persist when sprayed on plants and chemicals like parathion that virtually disappear within a few days. It is intermediate in persistence and toxicity, but effective against both chewing insects like some caterpillars and sucking insects like some aphids and spittlebugs.

Early in the endosulfan research, scientists found that persistence of residue on coastal bermudagrass pastures varied, depending on the formulations tested. These formulations, in decreasing order of persistence, were: (1) oil solution; (2) water emulsion; (3) wettable powder; (4) dust; and (5) granules. Residue levels were checked for 42 days after treatment.

To check the safety of endosulfan on pasture, the researchers sprayed water emulsions on coastal bermuda-

Fat Sample Shows Residue Level

ONE SMALL SAMPLE of body fat taken from the base of the tail can tell a scientist whether DDT pesticide residues have accumulated in any part of the body of live cattle.

Scientists checking for pesticide accumulation in animals knew that when residues of fat-soluble pesticide like DDT are taken into the body, they accumulate in fatty tissues.

But obtaining research results would be greatly simplified if a small sample of just one body-fat deposit provided an accurate indication of residue in all body-fat deposits. Sampling animals with minor surgery could then replace the overall fat analysis, which requires sacrificing the animal.

ARS beef cattle physiologist T. S. Rumsey compared the level of residue in 13 body locations of cattle exposed to DDT. The fat deposits checked were in or near the following areas: the abomasum (part of the stomach), small intestine, cod, base of the tail, inside and outside the rib cage, heart, kidney, and brisket. Muscle tissues in the round, ribeye, tenderloin, and heart were also analyzed.

Steers and cows on trial received either a 30-day exposure to moderate doses of DDT, simulating the effect of above average extended intake; or they received the same amount of DDT in a 3-day exposure, simulating an accidental exposure to a concentrated form of DDT.

Although tissues varied considerably in DDT concentration, Rumsey found, on the average, that residue concentration in the pure fat of samples from all parts of the body was the same. The level of concentration varied directly with the proportion of pure fat in the tissue, as earlier research had shown. This means that if researchers extract pure fat from tissue samples, any convenient tissue with fat in it could be used to determine DDT concentration in the animal as a whole.

Physiologist Rumsey says his findings do not mean that the amount of residue deposited in various fatty tissues of an individual animal is exactly uniform. But in a group of animals, any differences average out.

So, under usual research conditions, where several animals receive similar treatment, a single fat sample at the base of the tail of each animal can tell the residue story.■

grass at about four times the level needed for insect control. Hereford steers grazed on the pasture starting 1, 7, and 13 days after spraying. After pasturing 31 to 36 days, none of the cattle were found to have endosulfan in their body fat.

Another bermudagrass pasture raised for silage was treated with endosulfan at about three times the level needed for insect control. When grass was cut for ensiling 7 days after spraying, the original residue level had decreased by 90 percent. This was partly because the grass had grown so fast.

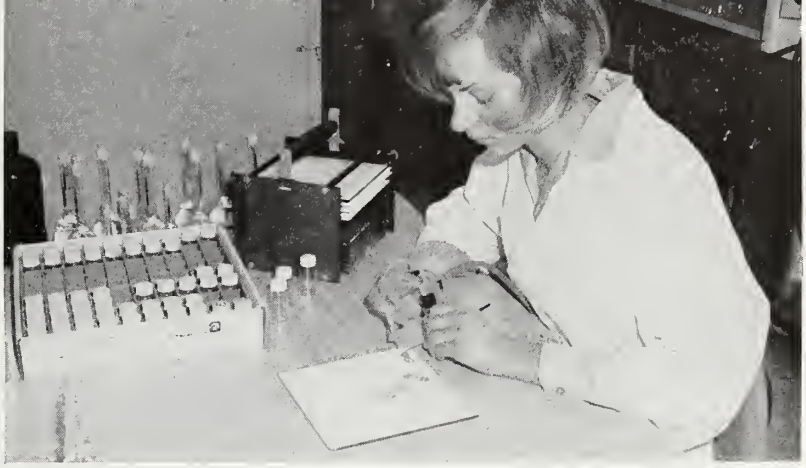
Silage was made in upright silos fitted with portholes at different heights that permitted scientists to take representative samples.

During 11 weeks of storage, the residues decreased from one-third to one-half of the level when the silos were filled. No residues were detected in the milk of dairy cows fed the treated silage.

The researchers also checked endosulfan persistence in dry mixed feed—largely processed alfalfa. In this test, they added endosulfan directly to a commercial ration and stored part loose and part pelleted. After 60 days of storage, endosulfan residues decreased 17 percent in the meal and 24 percent in the pellets.

The research team tested some unstored dry feed on steers being fattened in a feedlot. Moderate levels of endosulfan (up to 1.0 mg./kg. of body weight) added at feeding time produced no obvious reactions in the steers, and no residues accumulated in their body fat.

Participating ARS scientists in the endosulfan studies were entomologists E. W. Beck and D. B. Leuk; chemists L. H. Dawsey, M. C. Bowman, and D. W. Woodham; and dairy cattle specialist J. E. Robbins. Dairy specialist J. C. Johnson and veterinarian D. M. Bedell of the Georgia station cooperated.■



ARS laboratory aide Patricia Staggs transfers decomposed DDT products from thin layer plates to vials for radioactivity measurements.

PN-1495

Reducing DDT Persistence

ANAEROBIC BACTERIA—micro-organisms that live without air—may provide a way to reduce DDT accumulations in the soil.

The principle of anaerobic decomposition has been applied for many years by builders of septic tanks. The indication that it may also work on DDT suggests a solution to one of the most vexing problems concerning DDT—its persistence. Once released into the environment, DDT retains its toxic qualities for years, and it is almost sure to build up in the soils where it is used every year.

Soil scientist W. D. Guenzi and chemist W. E. Beard at the ARS Nitrogen Laboratory, Ft. Collins, Colo., treated soil samples with DDT and incubated the samples in an airtight chamber to promote growth of anaerobic micro-organisms.

After 4 weeks in the incubated soil, less than half of the applied DDT remained in its original form. The scientists also applied DDT to soil samples that had been sterilized to free them of all micro-organisms. In these samples, DDT remained intact throughout the 4-week test period.

Most of the DDT was converted directly to DDD, a material much less toxic than DDT. The scientists pointed out, however, that their experiment is only one step toward decomposition of DDT.

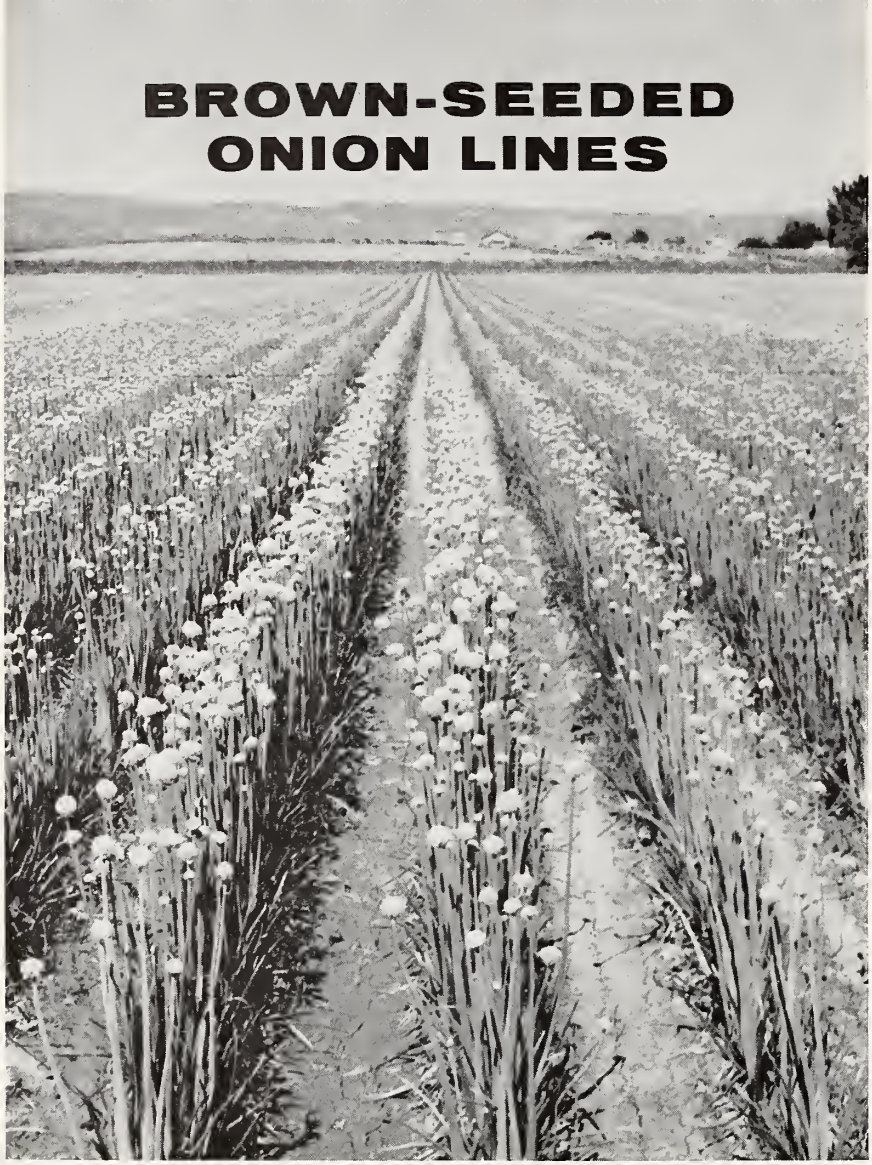
If they can decompose DDT anaerobically in the laboratory, their next step will be to develop ways of creating anaerobic conditions in the field. This might be done by flooding the land, thus sealing it off from contact with air and permitting anaerobic populations to flourish.

In the tests, Guenzi and Beard added 0.1 milligram of DDT to each 10-gram soil sample. The soil samples were moistened and incubated at 30 degrees C. in an atmosphere of 20 percent carbon dioxide and 80 percent nitrogen. Radioactive DDT was added to the soil so that DDT and its decomposition products could be identified by a scintillation counter.

After 2 weeks of incubation, 88 percent of the DDT remained in the soil samples; after 4 weeks, 34 percent.

Colorado Agricultural Experiment Station is cooperating on the project.■

BROWN-SEEDED ONION LINES



A pattern of 2 light- and 8 dark-colored rows alternates across a hybrid onion seed field at Homedale, Idaho. Light rows are pollen parents; the dark rows produce the hybrid seed.

PN–1496

SEEDMEN CAN NOW offset the increasing cost of producing hybrid onion seed by using seed-coat color as a positive means of identifying the hybrid seed.

Onion seeds are usually black. With present methods, the producer must take special care to keep the pollen-producing parents separate from the seed-producing parents. Otherwise, his harvested seed will be a mixture of hybrid seed and seed from the pollen parents.

Now, with brown-seeded breeding lines developed by ARS in cooperation with the Agricultural Experiment Stations of Idaho and Iowa, producers can eliminate the need for keeping pollen parents and seed parents separate by introducing the brown seed-coat color into one parent.

The brown-seeded lines are called B2246 and B58–614. They have a common ancestry in a single bulb of the onion variety Brigham Yellow Globe. When one plant produced from this bulb was noted to have brown seeds, researchers began developing the brown-seeded B2246.

B58–614 was developed from crosses between the brown-seeded subline of B2246B and the black-seeded line B2264B. A and B lines (male-steriles and maintainers, respectively) of B2246 and B58–614 have been released to seed producers but are recommended only as germ-plasm sources of the seed-color trait.

Using seed-coat color to identify hybrid seed would mean more efficient operation of the entire hybrid seed-producing process. Hybrid onion seed fields are usually planted so that 8, 10, or 12 rows of seed parents (male-steriles) alternate with 2 rows of pollen parents. After pollination, the rows of pollen parents are removed to prevent contamination of the hybrid seed during harvesting. This system does not always give the most effective pollination or the best seed yields.

If either the pollen parents or the seed parents carried genes for brown seed-coat color, the two kinds of seed or bulbs could be mixed at the desired ratio and planted throughout the field. This would insure uniform distribution of the pollen over the entire field. Also, there would be no need to keep the seed parents and the pollen parents separate when harvesting, and the entire crop could be handled as a unit.

Moreover, planting hybrid seed fields this way may permit increasing the ratio of seed parents to pollen parents without adverse effects on pollination. The result could be higher seed yields.

The only problem posed by this method of hybrid seed production is the final separation of the two colors of seeds. Most researchers feel that electronic sorting machines sensitive to the color difference are feasible. Electronic machines that do similar jobs are currently in use in the seed industry.■

Deathtrap for Horn Flies

Blacklight, cotton gauze impregnated with insecticide, and a wooden box have been combined into an inexpensive death trap for those irritating pests of dairy cattle, horn flies.

The new device was developed at Kerrville, Texas, by ARS entomologist N. O. Morgan. It combats the horn fly without repeated exposure of personnel and animals to pesticides.

Two of Morgan's traps, facing one another along a narrow chute through which cows passed, reduced horn flies to less than 50 per cow after only 9 days. At this level, flies no longer lowered milk production.

After 24 days, the device reduced horn flies by about 90 percent, from 175 per cow to 15 per cow.

Horn flies, Morgan explains, are highly responsive to certain ultraviolet light. With this in mind, he enclosed an ultraviolet fluorescent lamp in a box and covered the opening of the box with a gauze screen impregnated with insecticide. Any pesticide registered for use on horn flies can be applied. Horn flies, attracted by the light, collide with the gauze and are killed.

To make the trap more effective, Morgan installed a Blacklight Blue fluorescent lamp with a purple glass filter; the filter eliminates most of the visible light and allows predominantly ultraviolet waves to be emitted from the box. The power of attraction is definitely increased when only ultraviolet waves are emitted.

Morgan found that the device was most effective when used at night or early morning because the source of ultraviolet light does not have to compete with daylight.

The device is inexpensive and can easily be built by dairymen. The total cost for one unit, which includes the 15-watt BLB fluorescent tube, is about $9. The trap can be constructed in about 45 minutes, and the cost of electricity amounts to only pennies per month.

Michigan Hog Cholera Free

Michigan is the first major hog-producing State to be declared free of hog cholera in the nationwide campaign to eradicate this costly swine disease.

A certificate signed by Secretary of Agriculture Orville L. Freeman recognizing Michigan's achievement was presented to B. D. Hall, director of the Michigan Department of Agriculture, by Dr. E. J. Wilson of ARS on behalf of the Secretary.

Dr. Wilson pointed out that Michigan produces over a million hogs a year and ranks among the top third of the States in hog production. He called Michigan's success in the fight against hog cholera "a real accomplishment."

"We can now point to this achievement as continuing proof that hog cholera can be eradicated in any State where the people get together and decide, 'This job can be done.'"

Michigan is the seventh State to be officially named "hog cholera free." Other "hog-cholera-free" States are Vermont, Nevada, Utah, Montana, Alaska, and Idaho.

Dr. Wilson explained that Michigan achieved "hog-cholera-free" status by systematically completing all the procedures called for in the four-phase eradication program. Each phase represents a build-up in a State's fight against hog cholera until the disease is wiped out.

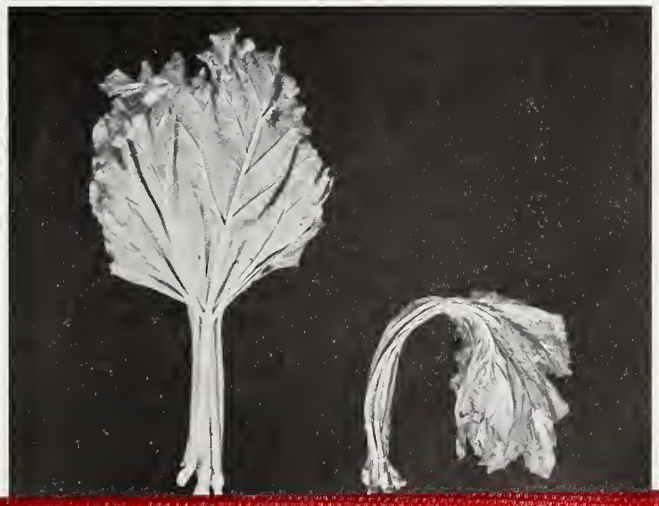
"Now that Michigan is free of this disease," Dr. Wilson added, "State and Federal regulatory workers are prepared to locate and wipe out any infection introduced from outside the State. Cooperative State-Federal indemnities are available to producers whose hogs are destroyed because of the disease."

Target date for a "hog cholera free" United States is 1972.

Longer Life for Rhubarb

The market life of rhubarb can be extended from 3 or 4 days to more than 4 weeks under optimum storage conditions.

Plant physiologist H. W. Hruschka, Agricultural Research Center, Belts-



Unwrapped rhubarb (right) wilted within 24 hours. Rhubarb wrapped in polyethylene (left) remained marketable after 5 weeks.

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ville, Md., obtained the best test results when he removed the leaves, packaged the stalks in moisture-proof film, and stored the rhubarb at 32° F. and 90 percent relative humidity.

Hruschka also found that cut rhubarb stalks wrapped in film made attractive consumer packages. Ten-inch pieces, however, would keep only half as long (2 weeks) as whole stalks. One-inch pieces also made attractive packages, but the greater number of cut surfaces increased perishability and reduced the storage life to 1 week.

In another phase of the study, Hruschka found that a hot water treatment of 2 minutes at 125° F. greatly reduced decay and extended the shelf life of the rhubarb from 1 day to 2 days in 70 degree temperatures.

Early-Maturing Oat

Wild oats are weeds on California farms, but, to the plant breeder, they contribute to an immense pool of genes.

From this pool, ARS and California scientists recently developed an oat variety that matures earlier than any other oat variety grown in the United States.

The new variety, Rapida, retains none of the undesirable traits of the typical wild oat. And because of its early maturity, it has natural protection from crown and stem rust and barley yellow dwarf virus.

Developed by C. A. Suneson, ARS agronomist, and J. T. Feather, of the Department of Agronomy at the University of California, Davis, Rapida can be profitably cultivated in regions not previously used for oats.

Farmers can grow Rapida in near-desert areas without irrigation or irrigate it for a double crop. Rapida will also serve well as a short-term cover crop or as a salvage crop after flooding.

When Rapida was sown during the summer, it matured in 70 to 75 days. When winter-sown, it matured 7 to 30 days earlier than Indio, the earliest oat variety grown in California.

Although Rapida's earliness is its distinctive feature, this earliness prompts special caution. When Rapida is sown during the winter, its flowering will often coincide with frost. In such situations, less than 40 pounds of seed per acre should be sown to delay maturity and spread the flowering of tillers on each plant.

Seeds will be available to growers following the 1967 harvest.

Detecting ASF Antibodies

When a hog, or any other animal, is vaccinated against a disease, it produces antibodies—usually a sign that the animal is protected from the disease.

But in some tests, hogs vaccinated with experimental African Swine Fever virus and later exposed to the disease proved immune, yet they had produced no detectable antibodies to combat the virus.

African Swine Fever, which strikes hogs in Africa and Europe, threatens our own hog industry. Animal disease researchers are concerned because, to date, no safe, effective vaccine has been developed against the disease.

ARS research veterinarian C. J. DeBoer at the Plum Island Animal Disease Laboratory, Greenport, N.Y., hopes to bring a vaccine closer to reality by investigating why antibodies to African Swine Fever virus cannot be detected.

It is possible that current laboratory methods are not sensitive enough to detect the antibodies in this case, or that the antibodies are neutralized by the vaccine.

Another possibility is that the vaccine interferes with the multiplication inside the hog of viruses that attack the body later, or that hogs develop a tolerance to the vaccine or to an attack from viruses without coming down with the disease.

CAUTION: In using pesticides discussed in this publication, follow directions and heed precautions on pesticide labels. Be particularly careful where there is danger to wildlife or possible contamination of water supplies.

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